

Urodynamic findings of multiple sclerosis patients at a single institution

Urodynamic findings of MS

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Abstract

Aim: Multiple sclerosis (MS) is a chronic and progressive disease of the central nervous system (CNS). The destructive effect of MS on the urogenital system has been demonstrated in many studies especially in young adults. Urodynamic evaluation is recommended in the diagnosis of urogenital system pathologies for MS patients. Unfortunately, there are not enough studies evaluating the urodynamic examinations of MS patients in our country. In this study, urodynamic findings of patients with MS were evaluated. **Material and Method:** A total of 58 patients (39 female and 19 male) were included in the study. The urodynamic findings of the patients in the same center between January 2011 and October 2017 were evaluated retrospectively. Urodynamic evaluation was performed with 20 ml of infusion per minute according to the International Continence Society standards. **Results:** The mean age of the patients was 47.4 ± 8.8 years. The mean duration of multiple sclerosis was 11.8 ± 7.4 years. When the features of multiple sclerosis were evaluated, 13 (22.4%) patients had a progressive type, 20 (34.5%) had a secondary progressive type, and 25 (43.1%) had relapsing-remitting (with relapses and remissions). The urodynamic findings of the patients are shown in Table 1. Urodynamic evaluations of patients with urinary incontinence are reported as 'Urge type urinary incontinence' was observed in 30 (83.3%), 'stress type urinary incontinence' in 5 (13.9%) and 'mixed type urinary incontinence' in 1 (2.8%) patient. **Discussion:** Multiple sclerosis is a common neurological pathology which has different urinary system findings. Detrusor overactivity is the most common urinary manifestation, and patients may also have impaired contractility, detrusor sphincter dyssynergia, urodynamic stress incontinence, and bladder outlet obstruction.

Keywords

Multiple Sclerosis; Urodynamic Findings; Detrusor Overactivity

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Introduction

Multiple sclerosis (MS) is a chronic and progressive immune-mediated disease of the central nervous system characterized by neural demyelination and axonal sparing [1]. It is mainly the disease of young adults with twofold female predominance, and the prevalence rates vary between 40 and 220 per 100.000 in different countries. Similar prevalence rates were reported in our country, which indicated that a significant number of the young adult population had to deal with this progressive multi-symptomatic neurological disease [2,3,4,5].

Although MS is a local neurological disease affecting the central nervous system, it causes a broad spectrum of symptoms related to different organ systems including the lower urinary tract. Bladder dysfunction is prevalent in MS patients, affecting 50-90% of patients. Even the symptoms associated with lower urinary system dysfunction may be the first referral cause for 10% of MS patients [2,6]. Multiple sclerosis may have a deteriorative effect on storage and emptying phases of bladder function. Most common lower urinary symptoms in multiple sclerosis patients are urgency and urge incontinence, which was related to detrusor overactivity. Voiding dysfunction, incomplete emptying of the bladder and urinary retention may also be seen in patients with MS.

According to EAU guidelines, invasive urodynamic evaluation is recommended at all neurogenic bladder patients [7]. The urodynamic assessment can document the lower urinary system dysfunction related to patients symptoms and may predict the possible risk factors for the upper urinary tract. It is also essential to define the types of the lower urinary system dysfunction at MS patients for epidemiological data. Several studies reported the urodynamic findings of MS patients in the literature [6,7,8,9]. On the other hand, this critical data is insufficient in our country. For this reason, documenting this data in our country is very important to create our epidemiologic library associated with the lower urinary system dysfunction in MS patients. In this study, we aimed to report the single institution urodynamic findings of MS patients.

Material and Methods

The medical records of 58 (39 female and 19 male) MS patients who applied to the urodynamic unit of our urology clinic between January 2011 and October 2017 were reviewed retrospectively. All the patients were diagnosed with MS in the neurology department of the same institution. The demographic properties of patients, including the disease pattern and the date of diagnosis, were reviewed. All patients underwent urological evaluation with a physical examination (including neurological examination), urinalysis, urine culture, plasma creatinine level, urinary system ultrasonography, urodynamic evaluation (with EMG and pressure-flow study), uroflowmetry and post voiding residual volume. In order to evaluate the neurological disability of the patients, we used the expanded disability status scale (EDSS). Urodynamic evaluation was performed according to the International Continence Society (ICS) standards (Aymed Medical Technology, Turkey) with an infusion rate of 20 ml/min [8].

Descriptive statistical analysis with frequency and percentage data was performed by SPSS 21.0 version.

Results

The mean age of the patients was 47.4 ± 8.8 (24-67) years, and the mean disease duration was 11.8 ± 7.4 years (2-34 years).

The type of MS was primary progressive in 13 (22.4%) patients, secondary progressive in 20 (34.5%) patients and relapsing-remitting in 25(43.1%) patients. Urinary incontinence was the most prevalent symptom in patients. A total of 30 (51.7%) patients applied to the outpatient clinic with incontinence. The type of incontinence was urge incontinence in 22 patients and mixt incontinence in 8 patients. Urgency was the second most common symptom as 14 (24.1%) patient applied to the clinic with urgency. The third most common symptom was hesitating to urinate. There were 10 (17.2%) patients with urinary hesitation, and 7 (12.1%) of them were in urinary retention. Other symptoms of the patients were bilateral flank pain in 2 (3.4%) patients and erectile dysfunction in 2(3.4%) patients. The mean serum creatinine level of patients was 0.68 mg/dl ranging between 0.40 and 0.92 mg/dl. There were only 2 (3.4%) patients with bilateral hydronephrosis, and both of them had urinary retention. Urodynamic diagnosis of patients is shown at Table 1. The mean maximum cystometric capacity (MCC) of patients was 414 ± 209 ml ranging between 51ml to 980ml. There were 18 (31.0%) patients with MCC less than 350ml and 16 (27.6%) patients with MCC greater than 500ml. A total of 24 (41.4%) patients had normal bladder capacity. The compliance of the bladder was normal in 47 (81.1%) patients, whereas it was hypo-compliant at 6 (10.3%) and hyper-compliant in 5 (8.6%) patients. Incontinence was documented in 36 (62.1%) patients during urodynamic evaluation. The type of incontinence was urge-type incontinence in 30 (83.3%) patients, stress-type incontinence in 5 (13.9%) patients and mix type incontinence in 1(2.8%) patient. Most of the patients with neurogenic detrusor overactivity had also urge incontinence during the storage phase. There were only 8 (20.5%) patients without incontinence in this group.

Table 1. Urodynamic findings of patients with multiple sclerosis

Urodynamic finding	Number of patients (%)
Normal	12(20.7)
NDO	14(24.1)
NDO+DSD	14(24.1)
NDO+IC	5(8.6)
IC	3(5.3)
StIK	4(6.9)
NDO+BOO	4(6.9)
NDO+StIK	2(3.4)
Total	58(100)

(NDO: Neurogenic Detrusor Overactivity, DSD: Detrusor-Sphincter Dyssynergia, IC: Impaired Contractility, StIK: Stress Type Incontinence, BOO: Bladder Outlet Obstruction)

The mean detrusor leak point pressure of the patients with urge incontinence was 58.6 ± 37.8 cmH₂O, ranging between 13 and 183 cmH₂O. The mean bladder volume at detrusor leak point pressure was 219.0 ± 161.4 ml ranging between 10 and 636 ml. Valsalva leak point pressure varied from 45 cmH₂O to 105 cmH₂O with a mean value of 82.5 ± 24.9 cmH₂O. The bladder volume at the Valsalva leak point pressure ranged from 53 ml to 442 ml with a mean volume of 204.3 ± 128.9 ml. Mean post-voiding residual volume (PVR) of patients was 83.8 ± 134.6 ml (0-711ml.). There were 10 (17,2%) patients with a PVR value > 150 ml. The mean EDSS score of the patients was 3.98 ± 1.74 . The mean EDSS of patients with and without detrusor overactivity was 4.26 ± 1.72 and 3.39 ± 1.67 , respectively ($p=0.073$).

The mean EDSS of patients with urge incontinence was $4,29 \pm 1,79$ whereas it was $3,59 \pm 1,63$ at patients without urge incontinence ($p=0.129$).

Discussion

Although MS is a neurological disease affecting the motor functions, urinary tract dysfunction related to this disease is also a significant problem leading to both structural and psychosocial distress. Even the symptoms of lower urinary tract dysfunction might be more challenging for patients compared to motor dysfunction. Extensive involvement of the central nervous system in MS patients leads to the high variability of voiding dysfunction [10]. Multiple sclerosis may affect both storage and emptying phase of voiding. Lower urinary tract symptoms were reported >80% of MS patients with detrusor overactivity being the leading lower urinary system pathology [9]. Detrusor underactivity and poor bladder compliance were the second and third most common findings of MS in urodynamic evaluation [10]. Although there were some studies reporting the urodynamic findings in MS patients in international literature, there is limited data in our country [6,7,8,9].

One of the studies reporting the urodynamic results of MS patients in our country was published by Onal et al. They reported the medical records of 249 and urodynamic findings of 75 MS patients [11]. In another study, Nakipoglu et al. reported the urodynamic results of 52 MS patients [12]. According to our knowledge, these were studies with the highest number of MS patients with urodynamic results. In this study, we reported the urodynamic results of 58 patients that may intensify the related data in our country.

Similar to the literature, there was a female predominance in our patients, and the most common MS type was relapsing remittent, which was also comparable to Onal et al.'s study [11]. Neurogenic detrusor overactivity was the most common urodynamic finding of our patients. Nearly 67% of MS patients had detrusor overactivity which was also comparable with other studies. Urodynamic evaluation of an MS patient may also be normal. The normal urodynamic evaluation rate in our study was 20%, which was reported as 15% at Onal et al.'s study [11]. On the other hand, both detrusor overactivity and normal urodynamic evaluation rates were significantly different at Nakipoglu et al.'s study. The percentage of DO was 27%, and the rate of the normal urodynamic finding was 42%. We believe that this difference was related to the study population. The patients at Onal et al.'s and our study were the patients that were referred to urology clinic for any reason. On the other hand, the patients of Nakipoglu et al.'s study were the patients at physical medicine and rehabilitation and neurology clinic [12]. The difference of patient characteristics might be responsible for this variability because the patients referred to urology clinic were supposed to have urological symptoms that directly increase the rate of abnormal urodynamic findings.

We also observed that impaired contractility was present in 15% of MS patients in our study. The rate of impaired contractility was 1,3% at Onal et al.'s study and 6% at Nakipoglu et al.'s study, which was significantly lower than our results. As multiple sclerosis can affect different parts of the central nervous system, findings of the lower urinary tract may also differ. This may be an explanation of different rates of impaired contractility in various studies. Nearly 60% of patients with impaired contractility also had neurogenic detrusor hyperactivity that can be named as detrusor hyperactivity with impaired contrac-

tility. Urodynamic stress incontinence was also observed in 10% of the patients. All of the patients in this group were female and older than 50 years old. As the stress urinary incontinence is a prevalent disease in this group, it is impossible to make a conclusion between MS and the presence of urodynamic stress incontinence. The rate of urodynamic stress incontinence was not reported in studies by Onal et al.'s and Nakipoglu et al. [11,12]. Detrusor-sphincter dyssynergia (DSD) is a significant risk for the upper urinary system in neurology patients. It is also prevalent in MS patients. The rate of DSD was 40% in Onal et al.'s study and 25% in Nakipoglu et al.'s study [11,12]. This rate was 24% in our study, and all patients with DSD also had neurogenic detrusor overactivity. Similar to our findings, all patients with DSD also had neurogenic detrusor overactivity in a study by Onal et al. [11]. Interestingly, although the rate of DSD with neurogenic detrusor overactivity is high in MS patients, upper urinary tract dysfunction is very rare. The rate of upper urinary tract dysfunction was 3.4% in our study, while in the study by Onal et al. it was 5%.

The degree of neurological disability is an important factor for MS. Expanded disability status scale is an objective tool to evaluate neurological disability of patients. We also used this scale to document any possible relationship between the degree of neurological disability and lower urinary tract symptoms, especially the neurogenic detrusor overactivity and urge incontinence. The patients who had neurogenic detrusor overactivity and urge incontinence had higher scores in EDSS. On the other hand, the difference was not statistically significant. This might be related to the number of patients in our study. Increasing the study population might be necessary to make a clear conclusion about the relation of neurological disability and detrusor overactivity.

One of the main limitations of our study was related to the study population. We were only able to evaluate the urodynamic findings of MS patients, who were referred to the urology clinic for lower urinary tract symptoms or general urological examination. For this reason, the population of the study did not cover all MS patients. As the urodynamic studies have invasive nature, it is not ethically acceptable to perform this invasive study to all MS patients. Another limitation of our study was related to the study population number. We were able to present the results of 58 patients who were evaluated in our urology clinic with urodynamic evaluation. Even the urology clinics with high patient volumes were able to publish their results with a limited number of patients. We believe that future multi-centric studies documenting national data will allow enriching the national library. For this reason, we believe that the number of study population has significant value to add scientific data for national data library.

Conclusion

Multiple sclerosis is a prevalent neurological disease that affects the urinary system. Although several studies documented that urinary system is affected by multiple sclerosis, very limited data was reported in our country. Detrusor overactivity was the main lower urinary tract dysfunction in multiple sclerosis patients evaluated in urology clinics for lower urinary tract symptoms. Impaired contractility, detrusor-sphincter dysfunction, urodynamic stress incontinence, and bladder outlet obstruction may also be observed. Urodynamic findings of multiple sclerosis patients may also be normal and upper urinary tract dysfunction is rare.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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